

Course Syllabus: Fundamental Clinical Microbiology BIOL 2144

General Information:

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| Course Meetings: | MWF (8:00 – 8:50 am) Bolin Hall 213 |
| Instructor: | James Masuoka, Ph.D. |
| Office: | Pierce Hall 150 |
| Telephone: | 397-4181 |
| E-mail: | james.masuoka@msutexas.edu |
| Office Hours: | MWF 10:00 – 11:00 am M 12:00 – 1:00 pm TR 1:00 – 2:00 pm (Other times by appointment) |

Course Description (from the catalog):

Introduction to the study of medically important bacteria, protozoa, viruses, helminths, and fungi. May not be applied to biology major.

Required Materials:

Microbiology: with Diseases by Body System by RW Bauman. 5th Edition. Pearson Benjamin Cummings, 2018. ISBN: 978-0-134-47720-6. **Note:** An e-text version of the textbook is included in the Mastering Microbiology links in the course D2L page through the Courseware Access and Affordability Program (see below).

Mastering Microbiology: Required digital materials for this course are part of the Courseware Access and Affordability Program at MSU Texas. Students are charged for required course materials on their student account with the Business Office.

Labster Access: All lab exercises this semester will be carried out virtually using simulations provided by Labster. An access code must be purchased from the MSU Bookstore. Simulations are accessed in D2L in your lab section page. Starting the first simulation will start the access process, during which you will need to enter your code. This process needs to be done only once.

Course Objectives (lecture):

- Compare and contrast the cellular structures of prokaryotic and eukaryotic cells
- Describe how specific cellular structures carry out processes such as motility, nutrient transport, energy production and reproduction
- Describe how microbial cell structures and processes can be the targets of antimicrobial agents, and explain how these relate to therapeutic decisions
- Explain the importance of aseptic technique in patient care
- Explain the impact of human activity on microbial evolution, and describe the mechanisms by which genetic information is modified and transferred between microorganisms
- Contrast the lifecycles of bacteria, eukaryotic microbes, and viruses

- Describe the environmental factors that affect microbial growth, and relate these factors to the environment of the human host and growth in laboratory culture
- Explain the various relationships that exist between microbes and the human host, and how both microbial and host factors influence development of disease
- Explain the factors important in microscopy and how each is optimized or controlled
- Relate microbial biology to means of identification, classification, and host defense mechanisms
- Describe how microbial genetic information flows and is shared
- Contrast the prokaryotic and eukaryotic pathways of carbohydrate catabolism

Course Objectives (lab):

- Explain good general laboratory safety practices
- Describe how good aseptic technique is used in the safe handling of microorganisms
- Explain how culture methods and other diagnostic tests are used to identify unknown microorganisms

Classroom Expectations and Policies:

- Students are expected to be prepared for lecture and lab by 1) reading the text, lab manual and handouts prior to coming to class; 2) having paper and pen at hand
- Students are expected to arrive a few minutes early to mentally prepare. If late arrival is unavoidable, the student should enter the class in a manner that creates as little disruption as possible.
- Points will be deducted from assignments turned in late.
- Student Conduct: Please refer to the MSU Student Handbook: (https://msutexas.edu/student-life/_assets/files/handbook.pdf) for university policies related to student responsibilities, rights, and activities. For example, see page 73 for valid grounds for an instructor drop (excessive absence, indifferent attitude, disruptive conduct, failure to meet class assignments), page 13 for the university's code of student conduct and page 55 for definitions of academic dishonesty that may be subject to disciplinary action (cheating, plagiarism, and collusion). In this class, academic dishonesty on an assignment or exam will minimally result in a score of 0 for that assignment or exam. Depending on the magnitude or frequency of these types of infractions, more severe sanctions – including being dropped from the course – will be imposed.
- **CELL PHONES (and other electronic devices): (READ THIS TWICE, PLEASE)** This class, as well as your other classes, requires your engagement, and typical cell phone use serves to detract from that engagement. While in class, your phone should be on “silent” (NOTE: vibrate is NOT silent).
- **Other electronic devices: laptops, tablets and similar devices will no longer be allowed to be used during lectures except when used as “electronic paper” to take written notes.** The ability to take good notes is a skill that university students must be able to master. Further, classroom studies have shown that taking notes by hand increases engagement in the material. Simply transcribing the lecture word-for-word is not helpful.
- Students with disabilities: It is the responsibility of the student to first contact Disability Support Services and then the instructor to decide what accommodations might be provided for a disability. It will be the responsibility of the student to plan to acquire notes. Any requests for accommodation must be made 2 weeks prior to the first exam.

- The professor considers this classroom to be a place where you will be treated with respect as a human being - regardless of gender, race, ethnicity, national origin, religious affiliation, sexual orientation, political beliefs, age, or ability. Additionally, diversity of thought is appreciated and encouraged, provided you can agree to disagree. Furthermore, guns or other weapons create a coercive environment that is neither safe nor conducive to learning. Therefore, weapons of any kind will not be allowed in my classroom. This includes guns, concealed or otherwise, regardless of licensure. Any student bringing a weapon to class or to lab will be immediately dropped from the course. It is the professor's expectation that ALL students consider the classroom a safe environment.
- The instructor reserves the right to amend these rules as needed throughout the term.

E-mail Policy:

I will respond to e-mail during regular school hours (8:30 am – 5:00 pm M-F). I will make every effort to respond to e-mail sent during the week within 24 hours. Those sent over the weekend will be attended to on Monday. Always include a subject line in your e-mail messages. It would be particularly helpful to include in the subject line the course number & section (*i.e.*, BIOL 2144). Questions about simple matters of class schedule or those that can otherwise be answered from information in this syllabus will be given low priority.

Attendance Policy:

Students are expected to attend all meetings of the classes in which they are enrolled. Although in general students are graded on intellectual effort and performance rather than attendance, absences may lower the student's grade where class attendance and class participation are considered essential by the faculty member. In those classes where attendance is considered as part of the grade, the instructor should inform students of the specifics in writing at the beginning of the semester in a syllabus or separate attendance policy statement. An instructor who has an attendance policy must keep records daily. The instructor must give the student a verbal or written warning prior to being dropped from the class. Instructor's records will stand as evidence of absences. A student with excessive absences may be dropped from a course by the instructor. Any individual faculty member or college has the authority to establish an attendance policy, providing the policy is in accordance with the General University Policies. [MSU Student Handbook, p. 61]

Absences will be excused for:

- a. **Death of an immediate family member.** An immediate family member is a grandparent, parent, sibling, spouse, in-law, aunt, uncle, or child.
- b. **Summons to appear in court or jury duty.** A copy of the summons is required.
- c. **Call to military service.** A copy of your orders to report is required.
- d. **University sponsored event.** Members of athletic teams, college bowl participants, etc. will be excused with proper notification.
- e. **Debilitating illness or disability.** Illnesses will be addressed on an individual basis. If a student is affected by an illness that is not debilitating, (*i.e.*, flu, virus infection) which may result in the student missing one or more consecutive class sessions, that student will be marked as unexcused for the number of days missed **unless a doctor's note is provided.**

ROUTINE APPOINTMENTS, medical or otherwise, AND VACATION TRAVEL ARE NOT ACCEPTABLE reasons for excused absences.

If you feel ill (esp. with signs and symptoms of COVID-19): Stay home and isolate yourself. Inform your instructor of your circumstances.

It is the responsibility of the student to obtain notes or other information covered in class during an absence.

Exam Policies:

- No make-up exams will be given in this course. If you must miss class during a midterm exam period, and it is an excusable absence (see above), then the cumulative part of the final exam will replace the missed midterm score. You must notify the instructor of problems **prior to** the start of the exam and provide the proper documentation as soon as possible. Only one midterm exam will be substituted for in this manner.
- Exams will not be moved for congested midterm or finals schedules.

Grading:

All exams and assignments count toward your final grade in the course and so it is important to do the best that you can on everything you turn in. If you find yourself having difficulties, please come to me for help early in the semester so that you give yourself time to improve.

Attendance is not a direct part of your course score. However, continual tardiness – and the resulting class disruption due to coming in late – will be considered and may influence your final points awarded. As stated above, cell phone use distracts from attention in class. Therefore, students who persist in using their mobile devices during class, except for designated classroom activities, will be marked as absent.

This course is not graded on a traditional curve. The course is worth 950 points. Grade categories and equivalent percentages are as shown: A (90-100%); B (80-89%); C (70-79%); D (60-69%); F (59% and below). Passing requires 60% of the points (unadjusted) for the course, or 560. Fractional percentages will be rounded at the end of the semester.

Lectures constitute approximately 60% of the BIOL 2144 grade. There will be three midterm exams, each worth 90 points. The final exam will be worth 180 points. Each exam, including the final, will focus on what was covered since the previous exam. However, each exam will also be cumulative in that each section of the course builds on what came before. The final will also be more typically cumulative in that it will cover the entire semester, focusing on material that needs to be reviewed (*i.e.*, most of the class got it wrong the first time around).

There is a part of the lecture score (100 points) related to the assigned reading. These assignments will be available through Mastering Microbiology accessed through the course D2L page. Assignments are available beginning the first day of class. Assignments will be due the day we begin discussion of that topic. Assignments may be completed after the due date for half credit.

In addition to the textbook reading assignments, there will be five (5) homework assignments. The purpose of these assignments is to: reinforce course concepts, introduce students to the operations of a clinical microbiology laboratory, and to highlight the diversity of science and the

scientists within the medical microbiology field. Assignment information will be posted on the course D2L page.

Lab constitutes approximately 40% of the BIOL 2144 grade. This semester, all laboratory work will be virtual. This is a result of Bolin Hall renovations and the loss of lab space. Laboratory work will be done using simulations through Labster (300 of 400 points). These simulations will also be used to reinforce concepts covered in lecture. Access to Labster and use of the simulations will be explained in the first week of class.

Each semester, the University sponsors the Undergraduate Research and Creative Activity Forum. In this Forum, students present their research findings or creative works. For this assignment, students will critically evaluate (30 of 400 points) three (3) poster presentations or three (3) oral presentations (or combination thereof). This will provide experience in both how to present results and how to critically evaluate data presented by others.

Participation (70 of 400 points) in both lecture and lab is critical to success in this (or any other) class. This includes attendance and participation in lecture discussion and completion of a pre-/post-semester concept inventory survey (10 pts). For the latter, I will be sending a link to the survey during the first week of class and about two weeks before the final exam.

Note:

- 1) No regrades will be provided for exams (short answer or questions other than multiple choice entered onto a Scantron form) done in pencil.
- 2) Misspelled words (esp. organism names) and incorrect taxonomic nomenclature will result in $\frac{1}{4}$ point deductions for each instance.

Assignment Summary:

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| Midterm exams: | 270 points (3 x 90 points) |
| Final Exam: | 180 points |
| Mastering Microbiology: | 100 points |
| Homeworks: | 50 points |
| Laboratory: | 400 points |
| Total: | 1000 points |

Important Dates (Fall 2024):

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| Classes begin: | August 26 |
| Midterm Exam 1: | September 23 (M) |
| Midterm Exam 2: | October 18 (F) |
| Midterm Exam 3: | November 11 (M) |
| Fall Research Forum: | November 22 (R) |
| Last day to drop with a W: | November 25 |
| Holiday Break: | November 27–29 |
| Classes end: | December 6 |
| Final Exam: | December 11 (Wednesday) (8:00 am – 10:00 am) |

Tentative Lecture Schedule

| Date | Week | Topic | Chapter (eText Sections) | Mastering Due Dates |
|-----------------|--|--|---|--|
| Aug 26 – 30 | 1 | Class Introduction, Relevance of Microbiology, Microscopy | 4 (4.1 – 4.3) | |
| Sept 2 | 2 | No Class: MLK Jr Day | | |
| Sept 4 – 6 | 2 | Microscopy, Cell Structure & Function (Eukaryote) | 4 (4.1 – 4.3) 3 (3.1, 3.2, 3.10 – 3.12) | Pre-semester Survey (9/4) 1, 2 (9/4) 3 (9/6) H1 (9/6) |
| Sept 9 – 13 | 3 | Cell Structure & Function (Eukaryote, Bacteria) | 3 (3.1 – 3.6, 3.10 – 3.12) | 4 (9/11) |
| Sept 16 – 20 | 4 | Culturing, Growth | 6 (6.2, 6.1, 6.3) | 5 (9/16) 6 (9/18) |
| Sept 23 – 27 | 5 | Exam 1 (Monday) , Metabolism | 5 (5.1 – 5.3) | 7 (9/25) H2 (9/27) |
| Sept 30 – Oct 4 | 6 | Metabolism, Gene Expression | 5 (5.1 – 5.3) 7 (7.1 – 7.3, 7.4 (Intro), 7.4.2) | 8 (10/2) |
| Oct 7 – 11 | 7 | Gene Expression, Classification: General, Bacteria, Eukaryotes | 7 (7.1 – 7.3, 7.4 (Intro), 7.4.2) 4 (4.4) 11 (11.1, 11.2) 12 (12.1 – 12.3, 12.6) | 9 (10/9) 10 (10/11) |
| Oct 14 – 18 | 8 | Classification: Eukaryotes, Viruses Exam 2 (Friday) | 12 (12.1 – 12.3, 12.6) 13 (13.1 – 13.3, 13.5) | 11 (10/14) H3 (10/14) 12 (10/16) |
| Oct 21 – 25 | 9 | Viruses Innate Immunity | 13 (13.1 – 13.3, 13.5) 15 (15.1 – 15.3) | 13 (10/23) |
| Oct 28 – Nov 1 | 10 | Innate Immunity, Adaptive Immunity | 15 (15.1 – 15.3), 16 (16.1 – 16.5) | 14 (10/28) |
| Nov 4 - 8 | 11 | Pathogenesis | 14 (14.1 - 14.8) | 15 (11/4) H4 (11/4) |
| Nov 11 - 15 | 12 | Exam 3 (Monday) Gastrointestinal* | 23 (23.1 - 23.6*) | 16 (11/13) |
| Nov 18 - 22 | 13 | Respiratory* Skin & Wounds* | 22 (22.1 - 22.6*) 19 (19.1 - 19.6*) | 17 (11/18) 18 (11/22) |
| Nov 25 | 14 | Skin & Wounds* Genitourinary* | 19 (19.1 - 19.6*) 24 (24.1 - 24.7*) | 19 (11/25) H5 (11/25) |
| Nov 27 – 29 | 14 | No Class: Thanksgiving Break | | |
| Dec 2 – 6 | 15 | Genitourinary* Nervous System*, Systemic* | 24 (24.1 - 24.7*) 20 (20.1 – 20.5, 20.7*) 21 (21.1 – 21.4*) | 20 (12/4) 21 (12/6) |
| Dec 11 | Final Exam (Wednesday) 8:00 am – 10:00 am | | | |

*Select diseases and infectious agents: see disease list

Tentative Schedule of Laboratory Simulations

| Week | Date (week of) | Simulations |
|-------------|-----------------------|--|
| 1 | August 26 | No Labs Scheduled |
| 2 | September 2 | Lab Safety Aseptic Technique Microscopy |
| 3 | September 9 | Cell Membrane & Transport: Types of Transporters Cell Membrane and Transport: Modifying the cell membrane Building a Gram-positive & Gram-negative Cell Wall Bacterial Cell Structure |
| 4 | September 16 | Bacterial Growth Curves Bacterial Quantification by Culture |
| 5 | September 23 | Cellular Respiration: Glycolysis Cellular Respiration: The Krebs Cycle Cellular Respiration: The Electron Transport Chain Gram Stain: stains & counterstains |
| 6 | September 30 | DNA: Structure and Function Protein Synthesis Using the Gram Stain to Help Diagnose Meningitis |
| 7 | October 7 | Genetic Transfer in Bacteria The Gram Stain |
| 8 | October 14 | Bacterial Isolation Identification of an Unknown Bacteria |
| 9 | October 21 | Blood Components Introduction to Immunology |
| 10 | October 28 | Antibodies Immunoassays |
| 11 | November 4 | ELISA Counting Cells |
| 12 | November 11 | Control of Microbial Growth PCR (Polymerase Chain Reaction) |
| 13 | November 18 | Pasteurization Attend Celebration of Scholarship (Thursday) |
| 14 | November 25 | Biosafety Thanksgiving Break (Thursday) |
| 15 | December 2 | No labs – Prepare for lecture final exam |